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A Cointegration Approach Towards the Real Exchange Rate Effects on Balance of Trade in India: Marshall Learner Condition

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Abstract According to the Marshall-Lerner, the sum of trade elasticities should be greater than one for a change in exchange rate to have a positive impact on the country's trade balance. In this study we tested the existence of the Marshall-Lerner condition in India with its seven major trading partners which are USA, UK, UAE, Saudi Arabia, Singapore, China and Hong Kong. The study conducted the stationarity test and Johansen cointegration test VECM and ARDL to estimate the trade elasticities in the case of 6 countries and the empirical results indicate that imports and exports respond significantly to a change in the exchange rate in India in the case of six countries, i.e. USA, UK, Saudi Arabia, UAE, China and Hong Kong., while there is no evidence of the Marshall-Lerner condition in India in the case of Singapore.

Keywords Marshall Learner Condition, VECM, ARDL, Elasticities, Export, Import

1. Introduction

Most of the nations in the world are integrated with the global economy through the channels of capital flows & international trade in which India is not an exception. Since independence, India's one of the main objective was to achieve economic self- reliance, which had to be realized through import substitution. But during independence our technology as well as the food availability was in a backward stage, Hence India had to be established essential industries which required importing a huge amount of capital goods. After that when India opened its market for foreign companies as part of globalization, it signed trade agreements with many other countries as being a member of the World Trade Organization (WTO) and reduced tariffs on its imports, thereby imports again increased and India couldn't reap the benefits of globalization due to its poor manufacturing base.

Thus India's over all imports have been growing fast which estimated US $ 1273M, in 1950 -51 and US$ 15869 million in 1980-81, and it increased again to US$ 465,581 million in 2017-18. During the time trade deficit was increased from US$ 4 million to 7383million in 1950 and 1980 respectively. During 1990-91, it was decreased to US $ 5932 million, though in 2017-18 it was increased again to US $ 162,054 million.

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Despite the long history of the downward trend in trade balance, it has turned positive and recorded a current account surplus of $600 million, or 0.1 per cent of GDP, for the period of January-March 2020, Reserve Bank of India (RBI). This is a rare occurrence because since 1976-77, there has not been a single year when India gained substantial merchandise trade surplus. This positive improvement in trade balance has been driven mainly by a decline in import due to Covid 19, and it may lead to a contraction in demand in the real economy (Pay & Ray, 2020). Briefly India is facing continuous trade deficit while other East Asian neighbouring countries enjoy all the prosperities of international trade.

In International Economics, there has always been debate on adjustments in exchange rate and its feasibility in solving BOP issues, many of the conventional trade theories proposed devaluation as an instrument to improve the trade balance for a country. Among which Marshall & Learner has given the most useful insight on how can the Balance of Payment be improved in such situation. However India never manipulated it's currency to gain benefit of exports like many other countries do.

Therefore the main objective of this study is to apply the Marshall Learner condition to evaluate the effect of devaluation on imports and exports in India using Annual series from 1996 to 2010. According to Alfred marshall and Abba Learner the trade balance is expected to worsens first, and improve further. And the theory lay down 3 conditions which are known as marshall learner condition.

Exd + Emd >1
Exd + Emd <1

Exd + Emd =1

The above condition indicates that the BOT will improve only if the sum of price elasticity for imports and exports is greater than one and if this sum is less than 1 then the devaluation will make the BOT worse and the exchange rate will leave the balance of payment if it is equal to 1. However, the overall effect of the devaluation makes an impact on the BOT of a country. Devaluation in the exchange rate influences the trade balance of a country through two ways even though the impact may vary due to different level of economic development. Firstly, devaluation encourages exports as these become cheaper for the foreign market. Secondly, it reduces the quantity of imports as they become costlier for domestic market, which leads to import substitution and enhances competitiveness in the exporting sector.

1.1. Statement of the Problem

The research was concerned about India's long time deterioration in balance of payment since its independence, Despite India's GDP reached US$ 2880000 million in 2019-20*, India reported a trade deficit of US$ 152880 million in 2020. Total exports from India including Merchandise and Services stood at US$ 528450 million in 2019-20, while total import was estimated at US$ 598610 million according to data from the Ministry of Commerce and Industry. Merchandise exports alone estimated at US$ 314310 million in 2019-20, while merchandise import stood at US$ 467190 million in the same period. (Foreign Trade Policy of India, Aug, 2020).

A BOT deficit might leads to wider structural economic problems, like loss of confidence, inadequate foreign investment, a decline in competitiveness in foreign market, and, a change in comparative advantage towards neighboring countries. Therefore it is vital to be studied in detail and to investigate the issues and solutions attached to that.

2. Literature Review

The application of Marshall Learner condition is not new to the world of economics especially in the economy of India. Therefore we summarize some of the relevant literature published so far, as follows.

Bahmani-Oskooee and Kara (2003) and Bahmani-Oskooee and Kara (2005) applied the Auto Regressive distribution Lag Method to analyse the price elasticities of Import & export demand for 28 countries and the study reported that the absolute values of the coefficients of price elasticities of import & export became greater than one for most of the countries in concern, except in Europe, where there the condition was not met. Mahmud et al. (2004) applied non-parametric technique to test the M-L condition, While the majority of the literature in the same concept utilizes cointegration methods, Langwasser (2009) analysed the sources of imbalances in balance of trade within the Euro area, using VECM to estimate the price elasticities of export and import, the study focused more on short-run dynamics and the long run received less attention. Therefore no conclusion is made about the Marshall -Learner condition in this study. Liu et al. (2006) also used VECM approach in the economy of Hong Kong and confirmed the M-L condition.

Junz and Rhomberg (1973), Magee (1973), Miles (1979), Levin (1983), Meade (1988), Noland (1989), Rose (1990), Bahmani-Oskooee and Malixi (1992), Boyd et al. (2001), Lee and Chinn (2002), Lal and Lowinger (2002), Hacker and Hatemi-J (2004), and others also played an important role in the contribution of the international trade and Balance of payment issues by applying M-L condition for countries other than India. Bahmani- Oskooee and Ratha (2004a) concluded that the devaluation of currency has different impact on trade balance in the short run and in the long run where the real depreciation of the currency improves the trade balance in the long run.

A study by Sinha (2001) also confirmed the Marshall-Lerner condition for all the five Asian countries in choice such as India, Japan, Philippines, Sri Lanka and Thailand with the exception of Sri Lanka.

Hsing (2010) also investigated the evidence of the Marshall Learner condition in eight Asian countries among which the validity of Marshall Learner condition only in Singapore and Malaysia was rejected.

Eita (2013) also reported the evidence in favour of the Marshall Lerner Condition for India'.

Brooks (1999) empirically estimated the Marshall Learner condition for the bilateral trade balance between the US and G7 countries using Johansen-Juselius FIML estimation method and Error Correction Model in the economy of USA and the results of the study indicate that the that the depreciation of dollar improve the trade balance of USA . Dash (2013) investigated the correlation between the trade balance and exchange rate devaluation with its four major trading partners using Johansen-Juselius multivariate cointegration approach. The findings of the study indicated that there is no evidence in favor of India's trade with US and UK, and the Marshall Learner condition hold only in case of trade with Germany. Panda & Reddy (2016) estimated the bilateral trade relationship between China and India using ARDL and ECM model and the study rejected the validity of M-L condition thereby the study concluded that Rupee devaluation doesn't make any impact on the improvement in trade balance of India with China.

Another study by Tripti and Gargi Bandyopadhyay (2016) tested Marshall-Lerner Condition in India based on a sugar industry using the cointegration via SAS and finally OLS technique in the Pre reform (1962-1990) and Post reform interlude (1991-2013) considering the annual data of five variables namely; Exports, Imports, GNI, Exchange Rate and the World Income. The study reported that the Marshall-Lerner condition is satisfied in both periods.

Adnan Ali Shahzad (2017) used the panel data from seven Asian countries such as Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri-Lanka to analyses the effect of devaluation on trade balance for the period of 1993 to 2010

and adopted the random effects model to estimate the price elasticities of export and import. The study realized that the, M-L condition does not fulfill.

Ritesh Pandey (2013) attempted to examine the Marshall Lerner condition in relation to India's international trade using a multivariate cointegration approach. And the research confirmed that Marshall Lerner condition holds for the case of India. Yu Hsing (2010) The study applied in the economy of US with its trading partners Hong Kong, Japan, Korea, Malaysia, Pakistan, Singapore, Thailand, and India and confirmed marshall Learner condition in Korea, Japan and Pakistan, India, Hong Kong, Singapore and Thailand using while it wasn't confirmed in Malaysia.

Sandeep Ramesh &Deepak Garg(2005) used import and Export demand functions for India to empirically analyse the income and exchange rate elasticities using Johansen Co-integration model and VECM is used to establish the cointegration between the variables in concern and there was no evidence for Marshall-Lerner condition in India.

3. Methodology

In this study, the annual data series from 1990 to 2018 has been used which was collected from the various sources such as International Financial Statistics (IFS), WITS & the World Bank database for each variable. The study used time series data for the real effective exchange rate for India (*REERi*), India's exports (*Xi*) and imports (*Mi*), India's annual income (*Yi*) as well as the income of major trading partners (*Y*t*) which were converted into logarithms and tested for stationarity using the ADF test. If the series are found to be integrated of the same order, we test cointegration using Johansen's maximum eigenvalue test otherwise use ARDL model. Guidelines for deciding on the number of lags for the test specification is provided by various information -based criteria like Akaike Information Criterion (AIC), If the variables cointegrated the study will have to use VECM to estimate India's import and export trade elasticity with each of its major partnering countries separately.

3.1. Model Building

$$LMi,t = \alpha o + \alpha 1 LYi,t + \alpha 2 LY*,t + \alpha 3 LREERi,t + \varepsilon i,t \quad (1)$$

$$LXi,t = \alpha o + \alpha' 1 LYi,t + \alpha' 2 LY*,t - \alpha' 3 LREERi,t + \varepsilon i,t \quad (2)$$

LMi,t and LXi,t represents import of India from its major trading partners and exports of India to the same respectively. Yi and Y* represents the real GDP of India and its major partnering countries respectively. Whereas, REER is the real effective exchange rate of India with the rest of the world. Then εi,t captures the error term.

According to the existing theories regarding the devaluation, currency devaluation will decrease the costs of import from India which encourage India's exports, while it discourages imports as it become expensive. The above linear form of equations 1 and 2 represents the import and export elasticity of demand. It is assumed that real depreciation of currency might cause a discourage imports and encourage exports. Therefore α3 have positive expected sign and α'3 have negative expected signs. It's also assumed that income elasticity to be positive, which postulates that an increase in income of India (y) (ith country) might cause imports to rise and an increase in partnering country's income (y*) might cause exports to rise, α1 and α'2 have also positive expected signs. Also, we expect the absolute sum of import price elasticity and export price elasticity will be greater than one, meaning that in the above model, the sum total of the coefficients of LREERi,t should be greater than one to satisfy Marshall Learner condition which is the main objective of the study. The mathematical expression can be written as $|\alpha 3| + |\alpha' 3| > 1$.

3.2. Empirical Estimations

Empirical Estimation in this study is a long- run phenomenon as the main objective of the study is to check whether the Marshall-Lerner condition holds in India. The appropriate methodology for testing the Marshall- Learner condition is cointegration analysis. Here we used Johansen Cointegration and ARDL to check the long - run relationship between the variables and further used Vector Error Correction model to estimate the price elasticities of export and the import. However, the order of integration is a pre-condition when deciding whether to go for Johansen Cointegration or Auto Regressive Distribution Lag (ARDL) approach. Therefore the unit root tests based on ADF test was performed which was given in Table 1 below:

3.2.1. Unit Root Testing

The table below indicates that all the variables are non-stationary at its level except the log GDP of UAE. Therefore the appropriate method was Johansen Juselius co-integration to check the coinegration of India's trade relationship between those countries in concern except UAE, as the UAE's GDP growth is stationary at its level, which we use ARDL method to analyze India's trading relationship with UAE. Furthermore, as a precondition to follow the necessary tests, we decided the variable's lag length and we rely on Akaike information criterion (AIC) and Schwarz information criterion (SC). The results points out that they are almost consistent across different lag order choices.

3.3. Johansen Cointegration Test

According to the information reported in Table 1, the appropriate method was Johansen Juselius co-integration for all the variables which are integrated I (1), Johansen cointegration use the maximum Eigen value statistics and the Trace test to determine the number of cointegrating vectors. Table 2 reports these two statistics for all six cases.

The null hypothesis of no cointegration, i.e., *r=0* is rejected at the 95 per cent significance level and the Eigen values and Trace statistics show that there is at most one co-integration Relationship between India's Exports and

imports demands for all the major trading partners except the Export demand in Singapore from India.

Table 1. ADF Unit Test

	Test Statics			**Order of integration**
Variable				
log(EXP_CHN)	3.483974(0.0165)	-3.559317(0.0529)	-3.083153(0.0034)	**1st**
log(EXP_HK)	-4.937362(0.0005)	5.428186(0.0008)	-5.428186(0.0008)	**1st**
log(EXP_SNGPR)	-4.217595(0.0029)	-4.228514(0.0128)	-3.755795(0.0006)	**1st**
log(EXP_SA)	-3.703805(.0099)	-3.654438(0.0437)	-3.446961(0.0013)	**1st**
log(EXP_UAE)	-3.905077(0.0064)	-4.190924(0.0144)	-3.928416(0.0004)	**1st**
log(EXP_UK)	-5.407822(0.0001)	-5.437654(0.0008)	-1.964299(0.0490)	**1st**
log(EXP_USA)	-5.211520(0.0002)	-5.308532(0.0011)	-3.002771(0.0041)	**1st**
log(IMP_CHN)	-5.211520(0.0002)	-5.308532(0.0011)	-3.002771(0.0041)	**1st**
log(IMP_HK)	-5.069302(0.0003)	-6.361799(0.0001)	-3.479220(0.0012)	**1st**
log(IMP_SNGPR)	-5.611900(0.0001)	-5.530870(0.0006)	-3.935057(0.0003)	**1st**
log(IMP_SA)	-3.865338(0.0068)	-3.798282(0.0324)	-2.766120(0.0076)	**1st**
log(IMP_UAE)	-3.777680(0.0083)	-3.714791(0.0386)	-3.660462(0.0007)	**1st**
log(IMP_USA)	-3.641286(0.0115)	-3.562659(0.0526)	-3.333696(0.0017)	**1st**
log(IMP_UK)	-5.605935(0.0001)	-4.172418(0.0173)	-5.107279(0.0000)	**1st**
Log REER	-6.332013(0.0000)	-6.192198(0.0001)	-6.151519(0.0000)	**1st**
LGDP_CHN	-5.976789(0.0000)	-5.453961(0.0008)	6.119727(0.0000)	**1st**
LGDP_ growth_HK	-6.606770(0.0000)	-6.428501(0.0002)	-6.756094(0.0000)	**1st**
LGDP_ growth_IND	-5.473641(0.0001)	-5.404141(0.0009)	-5.550655(0.0000)	**1st**
LGDP_ growth_SA	-5.045397(0.0019)	-5.031202(0.0080)	-5.214099(0.0001)	**1st**
LGDP_ growth_SNGPR	-4.452563(0.0096)	-6.206653(0.0003)	-6.541142(0.0000)	**1st**
LGDP_ growth_US	-5.452750(0.00	-5.316994(0.0018)	-5.600543(0.0000)	**1st**
LGDP_ growth_UK	-5.170580(0.0024)	-5.113694(0.0101)	-8.090754(0.0000)	**1st**
LGDP_ growth_UAE	-5.561981(0.0001)	-5.429888(0.0009)	-2.774689(0.0075)	**Level**

Table 2. Cointegration Results for Import and Export Demand

China Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.692714	49.22219	47.85613	0.0370	
	At most 1	0.287762	17.36279	29.79707	0.6132	
	At most 2	0.218584	8.200506	15.49471	0.4442	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.692714	31.85941	27.58434	0.0132	
	At most 1	0.287762	9.162283	21.13162	0.8191	
	At most 2	0.218584	6.659486	14.26460	0.5302	
China Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.748456	56.67068	47.85613	0.0060	
	At most 1	0.401884	19.40699	29.79707	0.4639	
	At most 2	0.103067	5.529778	15.49471	0.7503	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Egen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.748456	37.26368	27.58434	0.0021	
	At most 1	0.401884	13.87721	21.13162	0.3752	
	At most 2	0.103067	2.936902	14.26460	0.9509	

Hong Kong Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.809388	69.54715	47.85613	0.0001	
	At most 1	0.644639	34.73928	29.79707	0.0124	
	At most 2	0.414619	13.01225	15.49471	0.1144	
	hypothesized No. of CE(s)	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.809388	34.80787	27.58434	0.0050	
	At most 1	0.644639	21.72703	21.13162	0.0412	
	At most 2	0.414619	11.24536	14.26460	0.1424	
Hong Kong Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.781789	54.11368	47.85613	0.0115	
	At most 1	0.518856	22.14554	29.79707	0.2905	
	At most 2	0.255905	6.782172	15.49471	0.6031	
	hypothesized No. of CE(s)	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.781789	31.96813	27.58434	0.0128	
	At most 1	0.518856	15.36337	21.13162	0.2642	
	At most 2	0.255905	6.207305	14.26460	0.5867	
Singapore Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**No Co-integration**
	None *	0.699766	44.17090	47.85613	0.1064	
	At most 1	0.410384	18.90386	29.79707	0.4999	
	At most 2	0.279772	7.809914	15.49471	0.4859	
	hypothesized No. of CE(s)	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.699766	25.26704	27.58434	0.0962	
	At most 1	0.410384	11.09394	21.13162	0.6379	
	At most 2	0.279772	6.891935	14.26460	0.5020	
Singapore Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.783130	53.03836	47.85613	0.0151	
	At most 1	0.403604	20.94076	29.79707	0.3613	
	At most 2	0.306569	10.08688	15.49471	0.2741	
	hypothesized No. of CE(s)	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.783130	32.09761	27.58434	0.0122	
	At most 1	0.403604	10.85387	21.13162	0.6619	
	At most 2	0.306569	7.688184	14.26460	0.4113	
Saudi Arabia Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.867133	74.47933	47.85613	0.0000	
	At most 1	0.762949	38.14796	29.79707	0.0044	
	At most 2	0.425463	12.23733	15.49471	0.1459	
	hypothesized No. of CE(s)	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.867133	36.33137	27.58434	0.0029	
	At most 1	0.762949	25.91062	21.13162	0.0098	
	At most 2	0.425463	9.975432	14.26460	0.2136	

Saudi Arabia Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.891966	82.15472	47.85613	0.0000	
	At most 1	0.846192	42.09921	29.79707	0.0012	
	At most 2	0.311609	8.402267	15.49471	0.4234	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.891966	40.05551	27.58434	0.0008	
	At most 1	0.846192	33.69694	21.13162	0.0005	
	At most 2	0.311609	6.721177	14.26460	0.5226	

United Arab Emirates Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.826213	78.46704	47.85613	0.0000	
	At most 1	0.596601	36.46881	29.79707	0.0073	
	At most 2	0.428953	14.68089	15.49471	0.0661	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.826213	41.99823	27.58434	0.0004	
	At most 1	0.596601	21.78793	21.13162	0.0404	
	At most 2	0.428953	13.44682	14.26460	0.0670	

United States Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.752147	50.38679	47.85613	0.0284	
	At most 1	0.486095	21.09350	29.79707	0.3518	
	At most 2	0.222971	7.113444	15.49471	0.5645	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.752147	29.29328	27.58434	0.0299	
	At most 1	0.486095	13.98006	21.13162	0.3667	
		0.222971	5.297829	14.26460	0.7039	

United states Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.782655	60.02797	47.85613	0.0024	
	At most 1	0.502881	27.97628	29.79707	0.0799	
	At most 2	0.466833	13.29885	15.49471	0.1043	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.782655	32.05169	27.58434	0.0124	
	At most 1	0.502881	14.67743	21.13162	0.3121	
	At most 2	0.466833	13.20735	14.26460	0.0729	

United Kingdom Export Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.736427	55.61390	47.85613	0.0079	
	At most 1	0.586763	27.61195	29.79707	0.0875	
	At most 2	0.345446	9.053548	15.49471	0.3604	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.736427	28.00194	27.58434	0.0442	
	At most 1	0.586763	18.55841	21.13162	0.1103	
	At most 2	0.345446	8.899814	14.26460	0.2946	

United kingdom Import Demand	**hypothesized No. of CE(s)**	**Eigenvalue**	**trace Statistic**	**0.05Critical Value**	**Prob.****	**Co-integrated**
	None *	0.874641	65.20686	47.85613	0.0005	
	At most 1	0.411560	21.59875	29.79707	0.3214	
	At most 2	0.390396	10.46288	15.49471	0.2468	
	hypothesized No. of CE(s)	**Eigenvalue**	**Max Eigen Statistic**	**0.05Critical Value**	**Prob.****	
	None *	0.874641	43.60810	27.58434	0.0002	
	At most 1	0.411560	11.13587	21.13162	0.6338	
	At most 2	0.390396	10.39386	14.26460	0.1873	

3.4. Vector Error Correction Model (VECM)

After the evidence of co-integration relationship among the variables have been checked, the next step is obviously running the vector error correction model (VECM) using one less lag length (p-1). Where p is the optimal lag length determined with vector autoregressive (VAR), hence the optimal, lag length of the model was 2 and therefore vector error correction model (VECM) requires 1 lag length to run a regression. The following table depicts India's Price elasticities of Export and Import demand with each of the countries (China, Hong Kong, Saudi Arabia, the United Kingdom and the United States of America), and to check whether the Marshall Learner condition hold in India.

Table 3. Vector Error Correction Model (VECM)

	Export Equation		**Import Equation**	
China	**Variables**	**Co integrating equation**	**Variables**	**Co integrating equation**
	LEXP(-1)	1.0000000	LIMP(-1)	1.000000
	LY*(-1)	-1.367792	LY*(-1)	-.167422
	LREER(-1)	-7.764019	LREER(-1)	-7.324226
	LY(-1)	9.271104	LY	3.723298
	Error correction model			
	Co-integrating equation 1	-0.013275		-0.058596

	Export Equation		**Import Equation**	
Hong Kong	**Variables**	**Co integrating equation**	**Variables**	**Co integrating equation**
	LEXP(-1)	1.0000000	LIMP_HK(-1)	1.000000
	LY*(-1)	0.067771	LY*(-1)	0.647250
	LY	0.030842	LY	-0.129758
	LREER(-1)	-3.203390	LREER(-1)	-3.102557
	Error correction model			
	Co-integrating equation 1	-0.128604		-0.167187

	Export Equation		**Import Equation**	
Saudi Arabia	**Variables**	**Co integrating equation**	**Variables**	**Co integrating equation**
	LEXP_SA(-1)	1.000000	LIMP_SA(-1)	1.000000
	LREER(-1)	-13.17457	LREER(-1)	51.09119
	LY*(-1)	3.027271	LY*(-1)	-20.59649
	LY	9.468122	LY	-68.91154
	Error correction model			
	Co-integrating equation 1	0.006741		-0.003812

	Export Equation		Import Equation	
	Variables	**Co integrating equation**	**Variables**	**Co integrating equation**
USA	LEXP_USA(-1)	1.000000	LIMP_USA(-1)	1.000000
	LREER(-1)	-5.296333	LREER(-1)	-4.613852
	LY	2.094716	LY	2.465778
	LY*(-1)	0.813894	LY*(-1)	-0.796609
	Error correction model			
	Co-integrating equation 1	0.027788		-0.055314

	Export Equation		Import Equation	
	Variables	**Co integrating equation**	**Variables**	**Co integrating equation**
UK	LEXP_UK(-1)	1.000000	LIMP_UK(-1)	1.000000
	LREER(-1)	-5.330520	LREER(-1)	-4.803882
	LY*(-1)	-2.116843	LY*(-1)	-2.157284
	LY	2.460331	LY	3.279373
	Error correction model			
	Co-integrating equation 1	0.066007		0.019219

This study intends to estimate Marshall Lerner condition for India's export and import with its major 7 trade partners such as USA, UK, Saudi Arabia, UAE, Singapore, China and Hong Kong. According to the Marshall Learner condition, the devaluation is supposed to have a positive impact on exports and negative impact on its import in the long run, also the sum total of the absolute values of exports and imports has to be more than 1, and then only the devaluation would be success full. Here we used VECM to analyze India's import export demand elasticities in the case of 5 countries which are USA, UK, Saudi Arabia, China and Hong Kong. The empirical estimates show that there is long run cointegrating relationship between the exports and imports variables with the exchange rate also the empirical results confirm the existence of Marshall Lerner condition in the case of five countries, as the total of the absolute values of exports and imports coefficients are estimated more than 1.

3.5. Auto Regressive Distribution Lag (ARDL)

Auto Regressive Distribution Lag bounds testing approach to cointegration do not require same order of integration for all variables. The ADF test indicates that 1 variable which is real GDP of UAE is stationary at level while 3 other variables are stationary at 1st difference. Therefore an ARDL procedure of cointegration test can be applied to estimate the Export - Import Elasticities of India in connection with UAE. It is applied to examine the existence of long run equilibrium relationship among variables included in the model; the result was reported in the below table. The model is specified in its log form where the log of export and log of import is the dependent variable and real GDP in India, real GDP in UAE and real effective exchange rates are independent variables. The t - value which is more than 2 and the p- value which is significant at 5% shows the variable Lreer is significant. The test shows there was a long-run relationship between log of export and its independent variables which were evident in calculated F-statistic of 7.27 which is greater than the upper bound critical value of 3.67 at 5% level, therefor rejecting the null hypothesis of no co integration, while it is inconclusive that whether there is long run relationship between the log of import from UAE and the other variables are as the F statistic 2.77 which lies between upper and lower bound value at 10%. As it was at least not rejected the long run relationship, thereby it can be concluded that there was a long-run relationship between the export to and import from the UAE and all the other variables especially with the major variable in concern which is the exchange rate. Also, the sum total of the absolute values of export and import in response to 1% change in the exchange rate is more than 1 meaning that Exchange rate has a vital role in the trade balance of the country, and it holds Marshal leraner condition.

4. Conclusions

This study empirically estimated the existence of the Marshall-Lerner condition for India with its seven major trading partners which are USA, UK, UAE, Saudi Arabia, Singapore, China and Hong Kong. Import and export trade elasticity has been calculated separately with each country to evaluate that "Whether India fulfill the M-L condition or not". The study used an income of the trading partner (Y*), domestic income (Y) as controlled variables together with the independent variable exchange rate (Reer) to analyze the effect of exchange rate on India's exports and imports.

Table 4. ARDL to check India's trade relation with UAE

Export Equation				
Estimated equation	LEXP_UAE =f(LY*,LY,Lreer)			
Calculated value				
F-statistic	7.27			
			Critical value	
Significance level	Lower Bound	Upper Bound		
5%	2.79	3.67		
1%	3.65	4.66		
Variables	Coefficient	Std. Error	t-Statistics	P-value
LY*	0.4469	0.210	2.123	0.497
LY	1.149	1.356	0.847	0.409
Lreer	4.684	0.637	7.342	0.000
C	-6.155840	1.048	-5.872	0.000
Import Equation				
Estimated equation	Limp_UAE =f(LY*,LY,Lreer)			
Calculated value				
F-statistic	2.77			
			Critical value	
Significance level	Lower Bound	Upper Bound		
10%	2.37	3.2		
5%	2.79	3.67		
1%	3.65	4.66		
Variables	Coefficient	Std. Error	t-Statistics	P-value
LY*	-0.102	0.241	-0.423	0.676
LY	1.088	0.874	1.244	0.228
Lreer	5.001	0.760	6.575	0.000
C	-3.527	1.484	-2.376	0.028

The study conducted the stationarity test and Johansen cointegration test as a requirement for further tests, and found all the variables are stationary at 1st difference except real GDP for UAE which was stationary at level. Therefore we used two different tests which were VECM and ARDL to estimate the Import and export trade elasticity in the case of 6 countries except for Singapore according to the requirement for each equation. The Eigen values and trace show that there is not even one co-integration relationship in the case of Singapore therefore we conclude the Marshall Learner condition doesn't hold in India the case of Singapore.

As far the effects of exchange rate on export demand is concerned, the results are as per expectations, i.e., The empirical analysis confirmed that real exchange rate depreciation makes domestic goods competitive and boost exports and hurt import against her trading partners with the exception in the case of Singapore And finally to conclude about Marshall-Lerner condition, the study came up with the findings that the sum of exchange rate elasticities of imports and exports is greater than one in the case of six countries, i.e. USA, UK, Saudi Arabia, UAE, China and Hong Kong., while there is no evidence of the Marshall-Lerner condition in case of Singapore.

5. Policy Recommendations

The result of the study indicates that in the long run, Marshall Lerner condition is verified in the case of India. This suggests that elasticity approach to the balance of payments adjustments (devaluation) are intended for efficient and effective management of the trade balance of India, but together with the diversification of export basket away from traditional export patterns to improve competitiveness according to the international market demand. However, there are some limitations in the present study, which is that the study can be improved by testing the existence of J-curve phenomena in the country.

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Conflict of Interest

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